
DOG BITES—
AN UNRECOGNIZED EPIDEMIC

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FOR a period of approximately 20 years following World War II the annual incidence of dog bites in New York City remained virtually unchanged. However, beginning in 1965 the number of reported dog bites began to increase; between 1965 and 1972 the number increased by 37%, from 27,699 to 37,896.

In order to explore some of the factors associated with dog bites, a sample of 1,869 dog bites reported to the New York City Health Department between 1965 and 1970 was selected and analyzed both for each year of the period under study and in aggregate. A variety of host, agent, and environmental factors such as the age and sex of the victim, the anatomic site of the bite, time of day, season, geographic area where the incident occurred, and size of the dog were analyzed.

A tabulation of the data is presented, together with a number of conclusions about the risk factors associated with dog bites. The findings of this epidemiological study of dog bites in New York City also suggest the basis for designing a program to prevent such injuries which, for a variety of reasons explored in this paper, are becoming an increasingly common hazard of city life.

INTRODUCTION

Although the dog may be man's best friend, for the city-dweller dogs pose a hazard to health and safety. The sanitary and safety problems associated with urban dogs are centuries old, as are municipal

efforts to solve these problems. As early as 1660 Sheriff Nicasius de Sille of New Amsterdam requested of the city fathers regulations which would protect him from vicious dogs while he made his nightly rounds.¹ From available records it is not clear whether Sheriff de Sille's request was granted, but over the years numerous ordinances and regulations were enacted to protect New Yorkers against dogs.

During the 19th and the first half of the 20th century rabies was considered the most serious health hazard associated with dogs, and municipal efforts to control dogs were designed to combat the threat of this disease. These efforts ranged from laws which required dogs to be leashed or muzzled to more extreme measures. In the early 1800s the annual summer rabies scare triggered furious campaigns against stray dogs. At times an official dog-killer was appointed. A 50-cent bounty often encouraged the public to participate in a summer orgy of canicide. In 1849 at least 3,520 stray dogs were killed in what the *Daily Tribune* called the "annual bloody hunt."² The newspaper related that boys . . . scarcely so tall as the far nobler and more intelligent quadrupeds they assailed, went along the streets during the summer, staggering under clubs as heavy as themselves, striking down and then horribly mangling with many blows, every dog they encountered.

Such brutal measures against stray dogs disappeared from New York City in the latter half of the 19th century.

The last indigenously acquired case of human rabies in New York City occurred in 1954; the last confirmed case of canine rabies was recorded in the same year. With the decline in the incidence of rabies, both public and medical concern have diminished also. Although the hazard remains, there is little general fear of the urban dog as a transmitter of rabies.

In recent years a new concern has moved to the fore, perhaps as a result of the general growth in ecological awareness. Some segments of the public and a number of political leaders are voicing distress over the unwholesome nuisance caused by dog droppings in the city. Despite much attention given to this problem by the news media, proposed legislation designed to prevent the deposition of canine feces on city streets, sidewalks, and public parks has predictably aroused defensive resistance from zealous dog-lovers and has not progressed much beyond the stage of discussion. This controversy over canine feces has ob-

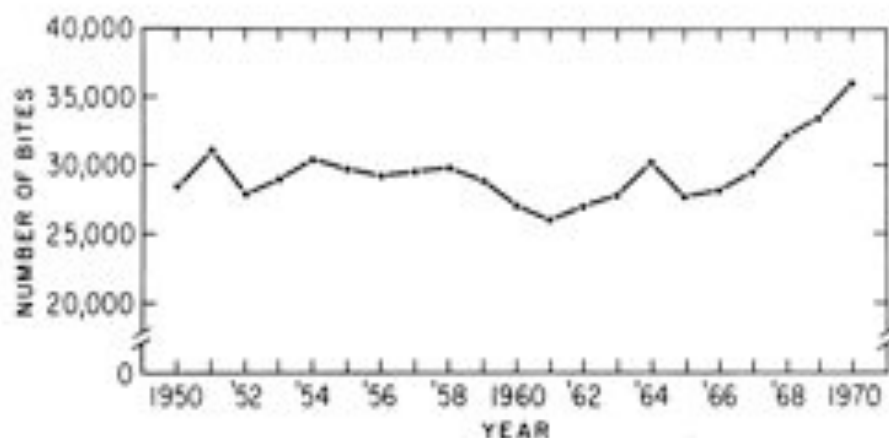


Fig. 1. Reported dog bites in New York City by year of report, 1950 to 1970.

secured a much more serious risk associated with dogs: dog bites. Public concern has been focused on the wrong end of the dog.

For decades the New York City Health Department has kept count of the annual number of reported dog bites (Figure 1). Until 1965, except for the years of World War II, the number of reported bites each year had been rather remarkably constant at about 28,500. However, beginning in 1965 the annual total began to rise; from 1965 to 1970 the number increased by approximately 33% (Figure 1). In order to explore this phenomenon and some of the concomitant risks, the New York City Health Department undertook an analysis of a 1% sample of dog bites reported in that period.

METHOD

According to the New York City Health Code, all animal bites must be reported to the Health Department. The bites are reported to the borough health departments by the police, private physicians, hospitals, health-department clinics, veterinarians, the American Society for the Prevention of Cruelty to Animals (ASPCA) shelters, and even by the persons bitten. Each source reports different information: e.g., a hospital form states the age and race of the person bitten, while a veterinarian's report mentions the breed of dog. The borough health centers accumulate all the information they receive concerning these

TABLE I. AGE AND SEX OF PERSONS BITTEN BY DOGS IN NEW YORK CITY, 1965 TO 1970. SAMPLE STUDY.

Sex	0-4 years		5-9 years		10-19 years		20-29 years		30-39 years		40-49 years		50-59 years		60+ years		Unknown age		All ages	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	96	8.9	217	20.1	393	36.2	111	10.3	70	6.5	76	7.0	48	4.5	52	4.8	177	11.8	1,063	37.8
Female	63	10.6	142	23.8	137	22.9	45	7.8	37	6.2	43	7.2	28	4.7	40	6.4	61	10.2	596	31.9
Unknown	12	6.2	17	8.8	12	6.1	6	3.1	6	3.1	7	3.6	3	1.5	2	2.0	128	66.3	193	10.8
Total	171	8.1	376	20.1	632	35.0	162	8.7	113	6.0	126	6.7	79	4.2	92	6.0	336	38.9	1,663	100.0

TABLE II. RACE OF DOG-BITE VICTIMS IN NEW YORK CITY, BY YEAR, 1965 TO 1970. SAMPLE STUDY.

Year	White		Black		Puerto Rican		Unknown		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
1965	86	31.8	23	8.3	3	1.1	163	58.8	277	
1966	77	27.3	33	11.7	6	2.1	166	58.8	282	
1967	72	28.4	29	9.8	2	0.7	192	65.1	295	
1968	86	27.4	42	13.1	12	3.7	179	55.8	321	
1969	35	28.6	33	9.9	7	2.1	197	59.3	332	
1970	81	23.9	48	13.3	10	2.8	216	60.0	365	
Total	506	27.1	208	11.1	40	2.1	1,113	59.6	1,867	

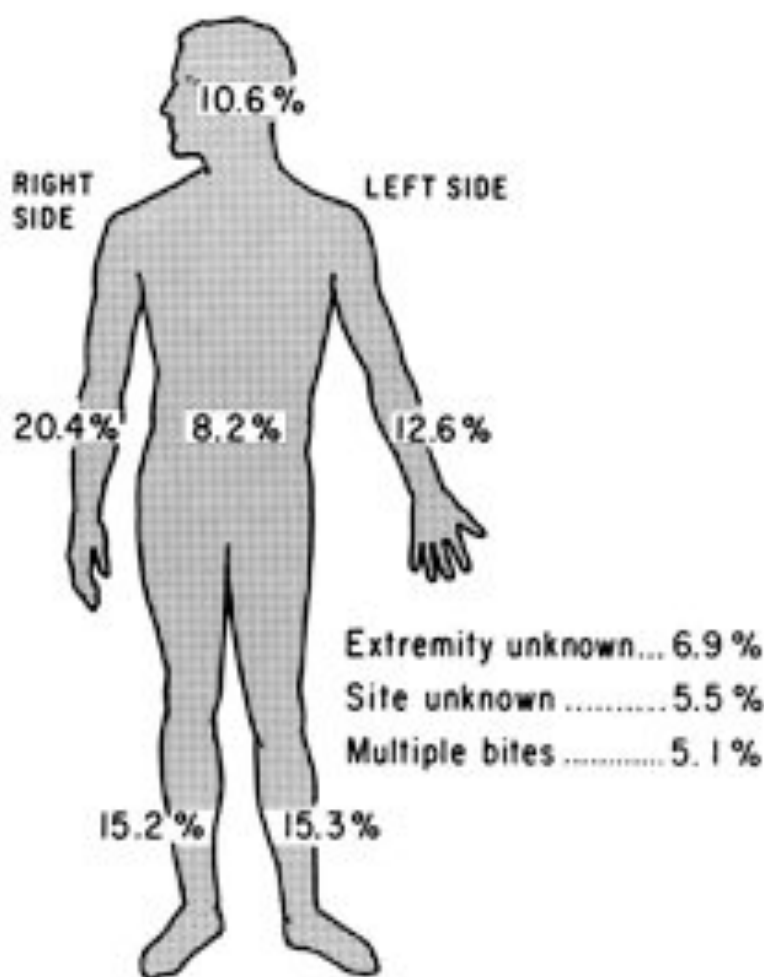


Fig. 2. Anatomical sites of reported dog bites in New York City, 1965 to 1970.

cases of dog bite and maintain the records for six years. The present study used the six-year period from 1965 to 1970 as its source of data. By means of tables of random numbers, a random sample of 1% of all bites occurring each year for each borough was chosen. In this sample of 1,869 bites, 13 variables for each bite were recorded and later analyzed. These variables were: the month, year, borough, and police precinct in which the bite occurred; the time of day the bite took place; whether the dog was in a private or public place at the time of the bite: e.g., in a home or on the street; the age, sex, and race of the

TABLE III. AGE DISTRIBUTION OF FACIAL DOG BITES IN NEW YORK CITY, 1965 to 1970. SAMPLE STUDY.

Age group (years)	Number of facial bites	% of total facial bites
0-4	68	31.7
5-9	65	32.7
10-14	18	9.0
15-19	7	3.5
20-29	3	1.5
30-39	3	1.5
40+	10	5.0
Age unknown	20	15.1
Total	199	100.0

person bitten; the anatomical site of the bite; the identity of the reporter; and the relation between the person bitten and the dog: i.e., whether the victim was the owner of the dog, or whether the dog was a stray, a neighbor's dog, or a dog owned by someone not living on the same street as the person bitten. From the breed reported by veterinarians, the dogs were also classified into three size categories: large, medium, and small. The data were keypunched and tabulated by a computer.

RESULTS

Age and sex of persons bitten. As shown in Table I, the majority of bites, 979 (51.2%), occurred in individuals less than 10 years of age. Over all, 1,080 bites (57.8%) occurred among males and 596 (31.9%) among females.

Race of persons bitten. The race of the persons bitten was unknown in 1,113 (59.6%) of the 1,867 bites sampled, as shown in Table II. This proportion of unknowns did not change appreciably during the six-year period under study. In the 754 cases where race was known, whites totaled 506 (27.1% of the total sample of 1,867), blacks 108 (11.1%), and Puerto Ricans 40 (2.1%).

Anatomical locations of bites. Figure 2 shows the anatomical distribution of dog bites. The majority were inflicted on extremities (70.4%). Of all anatomical sites, the right arm was the most frequently involved (20.4%). The left arm was involved in only 12.6%.

Age distribution of bites on the face. Of the 199 facial bites inflicted,

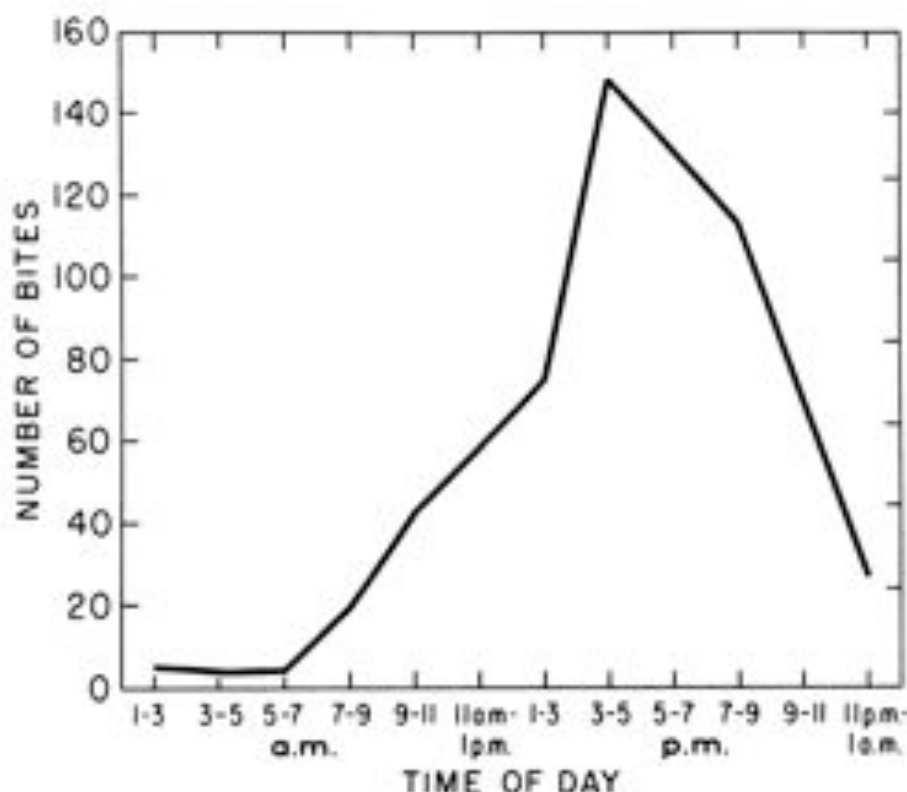


Fig. 3. Time distribution of reported dog bites in New York City, 1965 to 1970.

128 (64.4%) occurred in children less than 10 years of age and 146 (73.4%) in children less than 15 years of age. The overwhelming majority of facial bites, therefore, occurred in children and teen-agers (see Table III).

Time of occurrence. As shown in Figure 3, the peak period of dog bites extends from 1:00 P.M. to 9:00 P.M.; the apex occurs between 3:00 P.M. and 7:00 P.M.

Place of occurrence. Table IV presents the place of occurrence of bites in those cases where the borough was reported. Occurrence is reported only on those reporting forms which are used by the police department. Thus in Richmond, where most dog bites are reported by the police, the place of occurrence is known in most cases. For the city as a whole, the place of occurrence was not reported in 1,238

TABLE IV. PLACE OF OCCURRENCE OF DOG BITES, IN NEW YORK CITY, BY BOROUGH, 1965 TO 1970.* SAMPLE STUDY.

Borough	Private places†		Public places‡		Unknown		Total
	No.	%	No.	%	No.	%	
Manhattan	54	20.0	103	38.1	113	41.9	270
Brooms	44	11.2	20	5.0	209	76.8	292
Brooklyn	83	21.7	100	15.3	470	71.9	653
Queens	74	15.6	58	12.9	315	70.5	447
Statens Island	45	42.1	21	28.9	31	28.9	107
Total	300	15.1	331	17.7	1,336	65.2	1,968

*Data based on reports by Police Departments only.

†Homes, apartments, and nonprofit establishments.

‡Streets, parks, and public buildings.

TABLE V. RELATION OF DOG TO PERSON BITTEN IN NEW YORK CITY, BY YEAR, 1965 TO 1970. SAMPLE STUDY.

Year	Owner known			Owner unknown			Total
	No.	%	Total	No.	%	Total	
1965	59	21.3	273	31	11.2	277	550
1966	20	11.7	170	30	10.6	282	352
1967	46	15.6	294	35	11.9	295	589
1968	46	14.3	321	35	10.9	321	642
1969	54	14.3	378	29	8.7	332	710
1970	68	14.3	474	41	11.4	351	825
Total	306	15.4	1,996	201	10.8	1,868	3,864

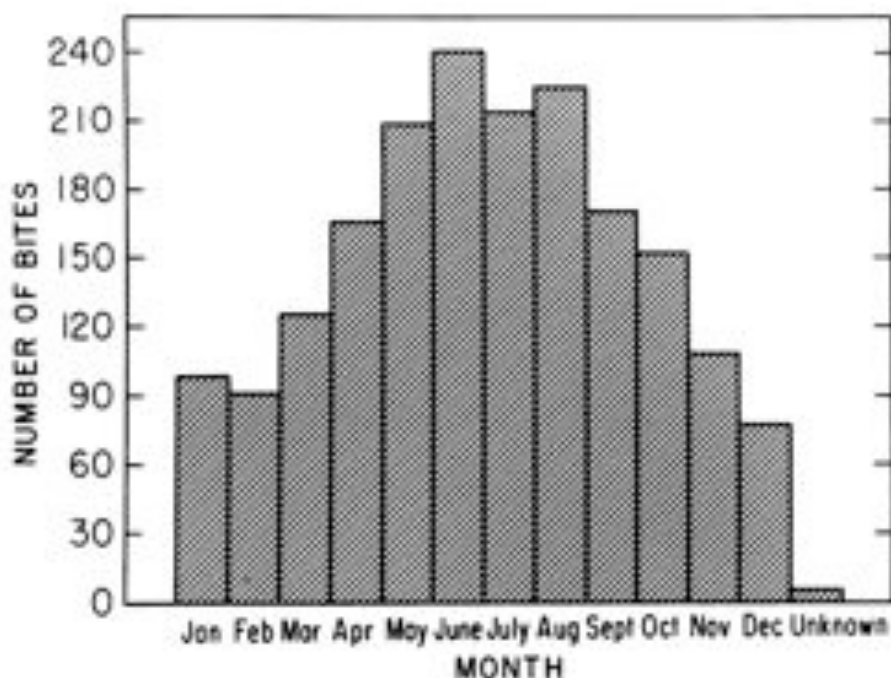


Fig. 4. Seasonal distribution of reported dog bites in New York City, 1963 to 1993. Copyright 1974 by The New York Times Co. Reprinted by permission from Brody, J. E.: Bites reported on the increase in city as more people acquire watchdogs. *The New York Times*, April 26, 1974.

(66.2%) of the cases sampled. In 16.1% of the cases the bites occurred in a private place, 17.7% in a public place. Private places are defined as homes, apartments, and nonpublic establishments. Public places are defined as streets, parks, and public buildings. In Richmond, although the total sample is small (101 cases), the place of occurrence was known in 71.0% of the cases: 42.1% occurred in a private place and 28.9% in a public place.

Seasonal distribution. Figure 4 presents the seasonal distribution of reported dog bites. The monthly incidence begins to rise in March and reaches a peak during the summer months, June through August. Thereafter the monthly incidence gradually falls.

Relation between dog and victim. Table V presents the relation between the dog and the person bitten for each year. In 10.7% of the cases the relation was unknown. In 10.8% of the cases the dog was a stray. The owner of the dog was known in the majority of cases: 1,467 (78.6%). In 696 (37.3%) the person bitten resided on a different street

TABLE VI. REPORTED SIZE OF DOGS INFLECTING BITES IN NEW YORK CITY, BY YEAR, 1965 TO 1970. SAMPLE STUDY.

Year	Large*		Medium†		Small‡		Unknown size		All sizes
	No.	%	No.	%	No.	%	No.	%	
1965	97	35.0	99	35.7	26	9.4	55	19.9	277
1966	133	47.2	77	27.3	13	4.5	59	20.9	282
1967	138	46.9	65	22.1	10	3.4	81	27.6	294
1968	139	43.2	86	26.8	11	3.4	85	26.5	321
1969	145	43.7	80	24.1	15	4.5	92	27.7	332
1970	158	43.8	75	20.8	11	3.1	117	32.4	361
Total	810	43.4	482	25.8	86	4.5	489	26.2	1,867

*Average adult weight of 50 lbs. or more.

†Average adult weight of between 15 and 50 lbs.

‡Average adult weight of less than 15 lbs.

than the dog and in 465 (24.9%) they resided on the same street. Only 306 (16.4%) of all victims were owners or members of their families.

Size of dogs inflicting bites. Table VI classifies the biting dogs by size. Large dogs, those with average adult weights of 50 lbs. or more, accounted for 810 (43.4%) of all bites, medium-sized dogs, with average adult weights of between 15 and 50 lbs., for 482 (25.8%), and small dogs, with average adult weights of less than 15 lbs., for only 86 (4.6%). In 489 cases (16.2%) the size of the dog was unknown. Large and medium-sized dogs accounted for the majority of bites in the city during the period under study. Since then, there has been no drastic change in this pattern.

Dog bites by borough of report. Table VII presents the total number of cases, by year and borough, for the period from 1965 to 1970. There has been an appreciable over-all rise in both the total number of bites—from 27,699 in 1965 to 36,057 in 1970—and the incidence—from 353.3 per 100,000 residents in 1965 to 456.6 in 1970. The greatest increases in dog bites between 1965 and 1970 have occurred in the Bronx, where 2,723 more bites were recorded in 1970; in Brooklyn, where an increase of 3,149 cases occurred; and in Queens, where an increase of 2,280 was recorded. The incidence per 100,000 residents rose from 367.2 to 546.4 in the Bronx, from 368.7 to 491.5 in Brooklyn, and from 342.3 to 441.3 in Queens over that period. The number of bites

TABLE VII. ALL REPORTED DOG BITES IN NEW YORK CITY, BY BOROUGH AND YEAR, 1965 TO 1970.

Borough	Population	1965		1966		1967		1968		1969		1970	
		No.	Fact- liter/denue*	No.	Fact- liter/denue	No.	Fact- liter/denue	No.	Fact- liter/denue	No.	Fact- liter/denue	No.	Fact- liter/denue
Manhattan	1,579,000	4,660	388.4	4,811	213.2	4,221	272.2	4,609	292.7	4,220	290.6	4,407	286.3
Bronx	1,460,000	5,319	367.2	5,392	384.8	6,658	415.5	6,637	455.2	7,464	508.7	8,042	546.4
Brooklyn	2,028,000	9,542	308.7	9,201	275.0	10,283	292.2	11,781	425.0	11,666	447.9	12,791	481.5
Queens	1,942,000	6,200	342.3	6,694	348.3	7,220	373.3	7,250	405.8	7,269	384.5	8,780	441.3
Richmond	277,000	1,569	608.4	1,792	689.6	1,792	692.5	1,797	639.9	1,940	671.9	2,037	680.4
Total	7,967,000	27,699	353.3	28,330	300.8	29,544	375.7	32,035	407.1	32,161	413.2	36,097	456.6

*Number of bites per 100,000 residents.

TABLE VIII. SOURCES OF REPORTS OF DOG BITES IN NEW YORK CITY, 1965 TO 1970. SAMPLE STUDY.

Borough	Police		Private physician		Hospital		Other source*		Unknown		Total No.
	No.	%	No.	%	No.	%	No.	%	No.	%	
Manhattan	28	10.4	16	8.9	176	65.2	49	18.1	1	0.4	270
Bronx	25	6.1	31	7.9	245	62.5	68	22.4	4	1.0	392
Brooklyn	107	22.6	51	7.8	290	28.3	183	28.0	2	0.3	633
Queens	28	6.4	69	15.4	197	41.9	141	31.5	22	4.9	447
Richmond	41	17.0	8	7.5	14	13.1	18	16.8	6	5.5	107
Total	208	16.5	115	9.4	972	64.7	479	25.6	35	1.9	1,669

*Person bitten, relative, or witness.

reported from Manhattan has remained stable, and only a slight increase occurred in Richmond, which already had a high incidence of bites in 1965. The latter increase is less significant when viewed against the background of the general increase in population in this borough; the incidence per 100,000 residents rose from 606.4 in 1965 to 689.4 in 1970.

Sources of reports. The sources of reports of dog bites are presented in Table VIII. For the city as a whole, the largest number of reports, 46.7%, came from hospitals. The police accounted for 16.5% and private physicians for 9.4%. In 25.6% reports were made by persons bitten, relatives, or witnesses. There are significant differences among the boroughs in the pattern of reporting. In Manhattan and the Bronx hospitals account for the majority of reports. In Brooklyn the police account for 25.6% of the reports and hospitals for 38.3%. In Queens, although hospitals account for 41.9% of the reports, private physicians account for 15.4%—almost twice the proportion noted in any other borough. In Richmond the police account for the majority of reports, 57.0%—a pattern quite distinct from that of any other borough.

DISCUSSION

Beginning in 1965 and continuing into the 1970s there has been a sharp increase in the number of dog bites in New York City. In a very real sense this epidemic has not been appreciated. The same trend has been recognized in other areas.^{4,6} In Baltimore the incidence of dog bites has more than doubled in the past 17 years, with the most significant increases occurring in the past three years.⁴ In 1969 the incidence of dog bites in Baltimore was 737 per 100,000 residents.⁴ The rate for New York City that year was 419 per 100,000, a little more than half that for Baltimore. However, the two are not comparable, since the environment of New York City is very diverse compared to Baltimore. The borough of Manhattan, comprised as it is of large apartment houses, has fewer unleashed, free-ranging dogs, which accounts for the lower incidence rate shown in Table VII. Richmond, which is comprised primarily of individual dwelling units and large, open spaces is more comparable to Baltimore; it has many more free-ranging dogs and an incidence rate close to that of Baltimore. The over-all incidence of dog bites in New York City rose to 475 per 100,000 in 1971 and 483 per 100,000 in 1972.

It is difficult to estimate the proportion of unreported bites. Craw-

ford estimated in 1964 that only half of the bites in Baltimore were reported.⁷ We estimate about the same proportion of unreported bites in New York City at present.

The increasing incidence of dog bites documented in this study is caused by a number of factors, including changes in the size and characteristics of the canine population and the increase in the number of unleashed, free-ranging dogs. Since accurate canine census data for New York City are lacking, the number of unlicensed dogs—although estimated to be large—can only be guessed. During the study program and into the early 1970s the number of dogs licensed annually by the ASPCA in New York City has remained at an average level of 375,000. However, during this period major shifts of the human population have occurred within the city, increasing the proportion of low-income inhabitants unlikely to pay a dog-license fee. It is estimated by the ASPCA and the Division of Veterinary Medicine of the New York City Department of Health that there are approximately 700,000 dogs in the city.

Alan Beck, in his comprehensive study of canine populations in Baltimore, found that dog ownership per family units ranged from 37% in low-income areas to 51% in middle-income areas.⁸ Schwabe estimated in 1969 that from 20 to 40% of city families owned at least one dog.⁹ Marx and Furcolow have estimated canine populations in a dog-to-human ratio of 1:7, based on surveys.⁹ Although it has inherent weaknesses, the ratio has been found to be accurate in many areas. On the basis of this ratio, the canine population of New York City would be approximately 1,109,000.

There is substantial evidence that there has been a change in the character of the canine population in New York City in recent years, with a trend toward large, feisty, and aggressive breeds. According to the American Kennel Club, poodles and German shepherds were the most popular pedigree breeds registered in the United States in 1970. However, because this register does not include mixed breeds it does not give an accurate characterization of the canine population. A strong motivation behind the increased ownership of large dogs is their use for the protection of person and property from criminal assault. The rise in reported dog bites in the mid-1960s coincides with heightened public concern about street crime and burglary (often associated in large cities with drug addiction).

Indirect evidence lending support to the hypothesis that there are more large, aggressive dogs in New York City can be drawn from an examination of the Yellow Pages of the city telephone directories. There has been an increase in the number of pets advertised in the Yellow Pages as guard dogs, trained to attack, for the five boroughs. Eight years ago advertisements for friendly dogs as pets were the only ones shown. Photographs of friendly poodles and terriers predominated. During the past few years this pattern of advertising has changed markedly; now several pages are devoted to advertisements of guard dogs. Pictures depicting growling German shepherds and boxers in aggressive attitudes predominate. Companies with such names as The House of Lethal Dogs and the We Bite Dog Academy are representative.

Most specialists involved with animals believe that a strong trend now exists toward the ownership of large, aggressive dogs in cities and suburbs and that this is linked to the use of dogs as deterrents to crime. Sikes notes that German shepherds with Doberman pinschers have attained heightened popularity with the demand for guard and attack dogs.² He also points out, as do others, that great Danes are seen more frequently in residential areas. Large animals such as great Danes, even though ordinarily mild mannered, pose a problem. Penned up in a city apartment all day or relegated to a small back yard, these dogs—whose need for exercise is proportionate to their size—have little opportunity for proper exercise. Such animals consequently become irritable, frustrated, and more likely to bite. Another disturbing trend has been the crossbreeding of dogs and wolves; the offspring tend to be extremely unpredictable and aggressive.

Slightly more than half of all bites occurred in persons less than 20 years of age (Table I). Morton found that in Norfolk, Va., 73% of all bites occurred in individuals less than 20 years of age.³ Berzon and co-workers found that close to 64% of all victims were less than 20 years of age.⁴ The New York City study revealed a lower proportion of bite victims in the group less than 20 years of age. However, as in the Baltimore and Norfolk studies, this group constituted the largest proportion of victims. Children and youngsters less than 20 years old have close contact with dogs, often handle them roughly, and are prone to approach and pet strange dogs. Also, many of the activities engaged in by children and teen-agers, such as cycling, running, and other action

sports tend to provoke dogs. The fact that 32.5% of all dog bites in New York City during the period examined occurred in adults more than 20 years of age may be accounted for by the presence of more aggressive breeds prone to bite without provocation.

The proportion of males bitten was found to be almost twice that of females (Table I). For all age groups the proportion of males bitten was higher than that of females. Morton's studies in Norfolk also revealed that males were bitten more frequently than females.³ Boys and men are generally more likely to have dogs as pets and they are more likely than females to come into close contact with unleashed, free-ranging dogs.

Because the race of victims was not reported in such a large proportion of the study sample, 59.6% (Table II), it is not possible to draw any firm conclusions in this area. Berzon and his co-workers in Baltimore found that there were no differences in race-specific incidence rates.⁴

The largest proportion of bites were inflicted on extremities, 70.4% (Figure 2). Morton found that 72% of all bites in Norfolk were inflicted on the extremities.⁵ Of the four extremities, the right arm was the most frequently bitten, accounting for 20.4% of all cases. The probable reason for this is that the majority of bite victims use their right arm in defending themselves from attacking dogs. Bites of the face occurred in 10.6% of all cases; of these 64.4% occurred in children less than 10 years of age. The easy accessibility of children's faces to attacking dogs largely explains the high proportion of facial bites among children.

Figures 3 and 4—showing, respectively, the time and the seasonal distribution of reported dog bites—clearly indicate that late afternoon and early evening hours and good-weather months are high-risk periods. Because such a large proportion of bites occur in children and teen-agers, we conclude from this data that contacts between dogs and youngsters must be more intense in the late afternoon and evening and during the summer months. The distribution of bites by time of day corresponds generally to patterns of both human and canine activity. Practically no dog bites occur at night, between 1 A.M. and 9 A.M. The period of the most intense dog-bite activity is between 3 P.M. and 7 P.M., when children are discharged from school, adults return from work, and dogs are walked—many after long hours of confinement in an apartment. Some authorities on dog behavior believe that dogs are less evenly tempered

in the afternoon and early evening. If this is so, it could help account for the diurnal variation in the frequency of dog bites.

The striking seasonal variation in the incidence of dog bites corroborates the results of previous surveys and seems to bear out the homily that the summer months are indeed the "dog days." Dog bites are least frequent in winter. However, the number of reported bites increases steadily through the spring, reaching a peak in June. This level of dog bites does not begin to recede until September. This seasonal pattern is most likely a reflection of the greatly increased opportunities for human-dog contact in streets and parks during more pleasant weather. The traditional summer-school recess brings children out of doors in large numbers, and the combination of dogs and children is likely to result in biting incidents. It may also be that hot weather exerts an influence on canine behavior, with the animals becoming more short of temper during the hot days of summer. The hypothesis that strays accounted for the summer increase in dog bites was not supported by our data; the proportion of bites caused by strays did not change significantly from month to month.

The place of occurrence of bites (Table IV) was only reported in a third of the total sample. Among the cases where the locations were known, an almost equal proportion occurred in private and public settings. However, there were differences among the boroughs in terms of this pattern. The greater proportion of bites in Manhattan and Brooklyn occurred in private places. The interpretation of this data is of little value, however, because the locations are unknown in such a large proportion of cases.

Table VII presents the borough-specific incidence rates for the six-year study period and the over-all city incidence rates. The over-all incidence for the city rose from 353.3 per 100,000 residents in 1965 to 456.6 per 100,000 in 1970. However, it is noteworthy that the incidence rate for Manhattan remained fairly stable. By contrast, the rate for the Bronx and Brooklyn rose dramatically. The rates in Queens and Richmond also rose, but less sharply than did those of the Bronx and Brooklyn. The rate for Richmond was more than twice as high as that for Manhattan in 1965 and has remained by far the highest of the five boroughs over the six-year period.

The differences in these rates can be accounted for by a number of factors. Manhattan has fewer unleashed, free-ranging dogs than any of

the other boroughs. By contrast, Richmond has many because the physical environment, composed as it is of one-family homes and much open space, makes it considerably less hazardous for an owner to allow his dog to roam unleashed. Manhattan, characterized as it is by high-rise apartment houses, a dense population, few open spaces, and heavy traffic is a setting in which few dog owners allow their pets to roam freely and unattended. Beck, in two systematic whole-city surveys of Baltimore, found that the numbers of unleashed, free-ranging dogs were greatest in those areas of the city characterized by high population density and low income.⁶ He also found that high-income residential areas and central business districts had few free-ranging dogs.

The increased incidence of dog bites in the Bronx and Brooklyn is accounted for not only by the shift to larger and more aggressive breeds but also by the transformation in recent years of vast portions of these two boroughs from middle-income to low-income communities where unleashed, free-ranging dogs abound. Although precise data are lacking, it is known that large portions of these two boroughs are high-crime areas in which many people now keep large and aggressive breeds to protect people and property. In these areas owners commonly let their dogs run alone on the streets, particularly in the early morning and evening. Beck found through an interview survey that in Baltimore 37% of dog owners allowed their dogs to roam freely on the streets.⁶ In the same vein, it can be said that the rise in the incidence of dog bites in Queens is attributable both to more dogs of the larger and aggressive type and to the transformation of the southeastern portion of the borough into a low-income area where there is a high incidence of free-ranging dogs.

In 78.6% of the cases the owner of the biting dog was known (Table V); in 21.5% the owner was unknown. As shown in Table V, stray dogs—that is, dogs considered to have no owners—accounted for only 10.8% of the bites. Another 10.7% of bites were accounted for by dogs which may or may not have been strays. If we presume that all of these were unowned strays, only 21.5% of all bites were accounted for by unowned stray animals. By contrast, the vast majority of bites were inflicted by dogs whose owners were known.

Stray dogs and those whose owners were unknown accounted for approximately one quarter of all bites in the Baltimore study by Berzon and his co-workers⁴—a figure closely approximating that found in the

present study. Only a small proportion, 16.4% of reported bites, are accounted for by victims who were bitten by their own dogs. However, it is highly likely that owners tend not to report bites inflicted by their own pets.

The attacks of packs of so-called stray dogs have often drawn much attention in the popular press. In many instances these packs of dogs are composed not of unowned, stray dogs but of owned dogs which are allowed to roam freely. Such animals often form packs in the morning or evening hours, particularly around a female in heat. The unowned, stray dogs are infrequently aggressive and more often than not bite only when provoked or harassed. In contrast, owned dogs which are permitted to roam the streets develop a sense of territorial possession, which includes not only the property of their owners but also the area in which they roam. A stranger walking down such a street risks being bitten by an aggressive dog which considers the street its territory.²⁰

During the six-year study period the proportions of biting dogs grouped by size did not change (Table VI). However, the proportion of dogs of unknown size did—from 19.9% in 1965 to 32.4% in 1970. Given the increase in the number of large dogs in the city in recent years, it is likely that a sizeable number of the "unknown" group is now made up of large dogs.

Table VIII shows that for the city as a whole hospitals are the most important single source of reports. This reflects the accessibility of hospital emergency care as well as the large number of New Yorkers for whom hospitals are the only sources of medical care. In areas such as Queens, where private family-physician services are more readily available and hospitals capable of emergency care few and widely scattered, the relative importance of hospitals as a source of reports dwindles. In Richmond the police precincts have for many years taken a special interest in dog bites and report the majority of them to the Department of Health.

SUMMARY AND RECOMMENDATIONS

During the past eight years there has been a sharp increase in the incidence of dog bites in New York City. Approximately 40,000 dog bites are now reported annually to the New York City Department of Health. The multiple causes of this epidemic are described in detail,

based on the detailed analysis of a random sample of bites which occurred during the six-year period between 1965 and 1970.

The alarming increase in dog bites and the large number of people affected are reasons enough for public health action. The medical profession should be better prepared to treat dog bite effectively to prevent complications and minimize disfigurement. However, the heaviest emphasis should be placed on preventive and control measures. Based on the New York City experience and the epidemiological evidence, the following dog-bite control program is recommended:

1) Local governmental health agencies must assume leadership. They must review their existing dog-bite statistics to ascertain whether there is a dog-bite problem in their community, how bad it is, and its patterns of occurrence.

2) The general public, not only the health professions, must be made acutely aware of the situation to enlist their support of a vigorous program of control measures. Without the full understanding of almost all segments of the community, any effort to control biting will run a high risk of failure—especially if dog enthusiasts view the program as anticanine. There is a strong traditional emphasis on the nobler aspects of the relation between man and dog in this country—where Lassie, Rin Tin Tin, and King of the North have achieved the status of folk heroes. Feelings run strong and the public health official who ignores them may doom himself to failure and even ridicule. Therefore, any program to control biting must be clearly pro-human or, even better, prochild rather than antidog. This can be achieved only if pains are taken to educate the public about the magnitude and gravity of dog bites. People must be made as aware and concerned about this problem as they were frightened and concerned about the hazard of rabies in the 19th century.

3) There must be a reliable dog-bite reporting system—with clearly stated responsibilities for physicians, veterinarians, hospitals, and police. The system should be designed to yield the local public-health agency sufficient epidemiological information on the host, agent, and environmental factors of dog bites.

4) With the broad-based support of the medical and veterinary professions, the local ASPCA, the police department, and parent-child interest groups, the local health department should mount an effective

health-education effort, which should strive to communicate the following messages:

a) Dog bites are a real and growing hazard to health, especially that of children.

b) People who live in urban and suburban residential areas should hesitate before purchasing large or aggressive dogs as pets, because of the increased risk of bites.

c) Guard and attack training—especially partial training—often makes a dog unsuitable as a pet because such training puts not just the would-be criminal, but also the neighbors, the family, and the owner at increased risk of dog-bite injury.

d) Dog owners have a community obligation to obey all leash laws, to never let their pets roam freely and, if possible, to walk their dogs at hours and in places relatively free from children. Owners of large dogs have an added responsibility to see that their pets get adequate, supervised exercise.

e) Health departments, with the assistance of their boards of health, should adopt and enforce strict ordinances, including leash laws, prohibitions against wolf-dog crossbreeding, the regulations of obedience, guard, and attack-dog training schools, mandatory registration and rabies immunization of dogs, and fair-but-firm provisions for the lawful destruction of proved ferocious or man-biting dogs.

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